

Citation:

Ask AS, Hernes S, Aarek I, Johannessen G, Haugen M. Changes in dietary pattern in 15 year old adolescents following a 4 month dietary intervention with school breakfast--a pilot study. Nutr J. 2006 Dec 7;5:33.

PubMed ID: [17150115](#)

Study Design:

Group randomized controlled trial

Class:

A - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To evaluate if dietary habits and school performance improved in a lower secondary school class as a result of introducing breakfast for 4 months.

Inclusion Criteria:

The entire 10th grade class in a rural district in Southern part of Norway. Included both males and females.

Exclusion Criteria:

not specified.

Description of Study Protocol:**Recruitment**

Five weeks prior to the study parents were invited to an evening meeting where oral and written information about the study was given. The importance of breakfast and a packed lunch for the students' cognitive performance was stressed. Practical information about nutritious packed lunches was also given. Four weeks before study start all students in 10th grade were given information about the study and invited to participate. Informed written consent was obtained from all parents and students.

Design: group randomized trial

Intervention (if applicable)

- Provided breakfast for 4 months (provided only to the intervention group) and information on a healthy diet(provided to both groups)
- The 10th grade was divided into two classes, and the class allocated to a free school breakfast each school day,(consisted of 15 males and 11 females) or a control class who did not receive breakfast (14 males and 14 females).
- Both classes were instructed in the importance of healthy eating and a data program to allow them to evaluate dietary intake was introduced.
- There were 2 questionnaires that the students were asked to complete four weeks before the beginning of the study and one week after the completion of the study; one on school performance, class environment, and school satisfaction in which the questions were chosen from a validated questionnaire and one short non-validated food frequency questionnaire.
- The teachers were asked to rate social behavior, i.e. school attention and punctuality, in the two classes at the beginning and at the end of the study .
- A conscientious objector working at the school was responsible for the preparation and serving of the breakfast.
- The other school class was not served breakfast, but got the same information about the importance of a healthy diet.
- Months one and three of the intervention period all students were given one hour training in a data program, which enabled the student to evaluate their own diet

Statistical Analysis

Due to study size, nonparametrical statistic analyses were performed.

- Descriptive data described as median (range)
- To analyze between group differences Mann-Whitney test was performed
- To test within group differences, Wilcoxon Signed Rank test was used.
- Statistical significance was set at $p < 0.05$.
- Data was analyzed using SPSS statistical software

Data Collection Summary:

Timing of Measurements

Before and one week after the study completetion.

Dependent Variables

- dietary habits-food frequency questionnaire
- school perfomance
- school contentment
- Height (H) and weight (W) were measured using standard equipment by the school nurse before and after the study.
- Body Mass Index (BMI) was calculated by $BMI = W(kg)/H$ to the definition established by Cole et al
- A blood sample was drawn for hemoglobin concentration measurements before and after the study.

Independent Variables

- school breakfast- served the beginning of each day consisting of: low fat milk, orange juice, whole grain bread with spreads of fish, meat and cheese and a fruit, also the students were offered a food supplement(vit/min and omega 3 fatty acids)
- control group no breakfast but the parents were encouraged to send a healthy lunch same as the intervention group.

Both groups were provided with healthy eating guidelines.

Control Variables

Description of Actual Data Sample:

Initial N:

- N=54 adolescents at age 15
- Intervention class (free school breakfast) n= 26 (15 males and 11 females).
- Control class had n= 28 (14 males and 14 females)

Attrition (final N): none reported

Age: 15 years of age

Ethnicity: not specified

Anthropometrics

BMI (kg/m²) -median (range)

- Intervention group :
 - males: 22.6 (17.8-33.6)
 - females: 21.8 (16.9-27.3)
- Control group:
 - males: 21.7 (17.0-29.4)
 - females: 21.6 (16.7-28.4)

Location: rural district in the southern region of Norway

Summary of Results:

Key Findings

- Before beginning the studyt 14 students (54%) in the breakfast group and 12 (43%) in the control group stated they had breakfast every day.
- Control group: 3 (10%) of the students had increased breakfast frequency as reported one week after the intervention period.
- Intervention group 52% of the students reported that they usually ate lunch every day before the intervention, and 58% reported lunch every day one week after.
- Control group were 81% at lunch before the study and 86% after the study, therefore lunch

intake was significantly higher in the control group as compared to intake of lunch in the intervention group ($p < 0.01$). This increase in lunch frequency was statistically significant in the control group ($p < 0.01$) after the four months, while there was a non significant increase in the intervention group.

- The healthy eating index increased significantly in the male student in the breakfast group ($p < 0.01$), as compared to the a non significant increase in the control group
- Students rating of the school environment did not improve in either group but the males in the intervention group reported increased satisfaction with school ($p < 0.05$).
- School performance as measured by time spent doing home-work, did not increase as a result of the intervention.
- The teachers did report an improvement in school attention and social behavior in the breakfast group, but was not statistically significant (due to too few teachers participating).

Other Findings

- There was no statistical difference with regard to weight, height or BMI between the two classes at the start of the intervention
- Following the intervention weight and BMI had increased significantly for all members of the control group ($p < 0.01$ for weight and $p < 0.05$ for BMI).
- There was a significant increase in weight in the males in the intervention group ($p < 0.05$), but not in the females.
- BMI did not change significantly in the intervention group.
- No changes were measured in hemoglobin concentration due to the intervention and none of the students had a hemoglobin concentration value below 11.0 g/100 mL

Author Conclusion:

"This study shows that breakfast offered to students in a secondary school class for 4 months improved dietary habits and reduced the weight gain. This could imply that a school meal could have major impact on health later in life. However, because the study had too little statistical power, evidence for improve school performance and social behavior in well nourished children

could not be established."

Reviewer Comments:

The authors/investigators were well aware of the short commings of the study such as the sample size, the lack of the teacher participation and conscientious objector was not well enough trained for the project and the implementation of the food supplement was not well utilized or encouraged.

Despite the limitations this pilot the results did show that this type of intervention could potentially improve dietary patterns and possibly be a good intervention for the treatment of obesity and possibly improving school performance. A larger clinical trial is needed and recommended for validating the preliminary results of this study.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

- | | | |
|----|---|-----|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | Yes |

Validity Questions

- | | | |
|------|---|-----|
| 1. | Was the research question clearly stated? | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated? | Yes |
| 1.3. | Were the target population and setting specified? | Yes |
| 2. | Was the selection of study subjects/patients free from bias? | Yes |
| 2.1. | Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study? | Yes |
| 2.2. | Were criteria applied equally to all study groups? | Yes |

| | | |
|-----------|--|-----|
| 2.3. | Were health, demographics, and other characteristics of subjects described? | Yes |
| 2.4. | Were the subjects/patients a representative sample of the relevant population? | Yes |
| 3. | Were study groups comparable? | Yes |
| 3.1. | Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT) | Yes |
| 3.2. | Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline? | Yes |
| 3.3. | Were concurrent controls used? (Concurrent preferred over historical controls.) | Yes |
| 3.4. | If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis? | N/A |
| 3.5. | If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.) | N/A |
| 3.6. | If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")? | N/A |
| 4. | Was method of handling withdrawals described? | Yes |
| 4.1. | Were follow-up methods described and the same for all groups? | Yes |
| 4.2. | Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%). | N/A |
| 4.3. | Were all enrolled subjects/patients (in the original sample) accounted for? | Yes |
| 4.4. | Were reasons for withdrawals similar across groups? | N/A |
| 4.5. | If diagnostic test, was decision to perform reference test not dependent on results of test under study? | Yes |
| 5. | Was blinding used to prevent introduction of bias? | Yes |
| 5.1. | In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate? | Yes |
| 5.2. | Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.) | Yes |

| | | |
|-----------|---|-----|
| 5.3. | In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded? | N/A |
| 5.4. | In case control study, was case definition explicit and case ascertainment not influenced by exposure status? | N/A |
| 5.5. | In diagnostic study, were test results blinded to patient history and other test results? | N/A |
| 6. | Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening/factors described? | Yes |
| 6.1. | In RCT or other intervention trial, were protocols described for all regimens studied? | Yes |
| 6.2. | In observational study, were interventions, study settings, and clinicians/provider described? | N/A |
| 6.3. | Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect? | Yes |
| 6.4. | Was the amount of exposure and, if relevant, subject/patient compliance measured? | Yes |
| 6.5. | Were co-interventions (e.g., ancillary treatments, other therapies) described? | Yes |
| 6.6. | Were extra or unplanned treatments described? | N/A |
| 6.7. | Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups? | Yes |
| 6.8. | In diagnostic study, were details of test administration and replication sufficient? | Yes |
| 7. | Were outcomes clearly defined and the measurements valid and reliable? | Yes |
| 7.1. | Were primary and secondary endpoints described and relevant to the question? | Yes |
| 7.2. | Were nutrition measures appropriate to question and outcomes of concern? | Yes |
| 7.3. | Was the period of follow-up long enough for important outcome(s) to occur? | Yes |
| 7.4. | Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures? | Yes |
| 7.5. | Was the measurement of effect at an appropriate level of precision? | Yes |
| 7.6. | Were other factors accounted for (measured) that could affect outcomes? | No |
| 7.7. | Were the measurements conducted consistently across groups? | Yes |
| 8. | Was the statistical analysis appropriate for the study design and type of outcome indicators? | Yes |

| | | |
|------------|--|-----|
| 8.1. | Were statistical analyses adequately described and the results reported appropriately? | Yes |
| 8.2. | Were correct statistical tests used and assumptions of test not violated? | Yes |
| 8.3. | Were statistics reported with levels of significance and/or confidence intervals? | Yes |
| 8.4. | Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)? | N/A |
| 8.5. | Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)? | No |
| 8.6. | Was clinical significance as well as statistical significance reported? | Yes |
| 8.7. | If negative findings, was a power calculation reported to address type 2 error? | Yes |
| 9. | Are conclusions supported by results with biases and limitations taken into consideration? | Yes |
| 9.1. | Is there a discussion of findings? | Yes |
| 9.2. | Are biases and study limitations identified and discussed? | Yes |
| 10. | Is bias due to study's funding or sponsorship unlikely? | Yes |
| 10.1. | Were sources of funding and investigators' affiliations described? | Yes |
| 10.2. | Was the study free from apparent conflict of interest? | Yes |

Copyright American Dietetic Association (ADA).